Brucellosis
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Missouri Department of Health and Senior Services
Communicable Disease Investigation Reference Manual

Brucellosis

Overview [1,2]

For a complete description of brucellosis, refer to the following texts:

- Control of Communicable Diseases Manual (CCDM).
- Red Book, Report of the Committee on Infectious Diseases.

NOTE: Brucellosis is a potential bioterrorism weapon. All cases of brucellosis reported in Missouri to date have been from naturally occurring cases. **If the case has no remarkable travel history and is not employed in an occupation that is prone to exposure, a bioterrorism event should be considered.** If you suspect that you are dealing with a bioterrorism situation, contact your Regional Communicable Disease Coordinator immediately.

Case Definition [3]

Clinical description

An illness characterized by acute or insidious onset of fever, night sweats, undue fatigue, anorexia, weight loss, headache, and arthralgia

Laboratory criteria for diagnosis

- Isolation of *Brucella* sp. from a clinical specimen, or
- Fourfold or greater rise in *Brucella* agglutination titer between acute- and convalescent-phase serum specimens obtained =2 weeks apart and studied at the same laboratory, or
- Demonstration by immunofluorescence of *Brucella* sp. in a clinical specimen

Case classification

Confirmed: a clinically compatible case that is laboratory confirmed

Probable: a clinically compatible case that is epidemiologically linked to a confirmed case or that has supportive serology (i.e., *Brucella* agglutination titer of =1:160 in one or more serum specimens obtained after onset of symptoms)

Information Needed for Investigation

Verify the diagnosis. Determine what laboratory tests were conducted and the results.

Establish the extent of illness. Determine if household or other close contacts are, or have been, ill by contacting the health care provider, patient or family member.

Determine the occupation of the index case since this information may help narrow the search for the route of exposure.

Determine if the case was exposed to brucellosis vaccine or to abortive livestock or aborted fetuses. Vaccine exposures should be reported to your Regional Communicable Disease

Coordinator so the information can be forwarded to the CDC, Meningitis and Special Pathogens Branch.[4]

Determine if the case had a history of foreign travel. Brucellosis is common in most Latin American Countries, around the Mediterranean, Africa, Central Asia, India and the Middle East. Collect the dates of travel to determine if the incubation period is compatible with the potential period of exposure.

Contact the Regional Communicable Disease Coordinator if it appears the disease was acquired locally. The Regional Communicable Disease Coordinator will alert the State Public Health Veterinarian who will alert the Missouri Department of Agriculture if the case appears to be of livestock origin.

Contact the Bureau of Child Care if cases are associated with a child care facility.

Case/Contact Follow Up And Control Measures

Determine the source of infection since the disease may be caused by one of four different species of *Brucella* [5].

- If the disease was confirmed by isolation of the *Brucella* species, this will help narrow the potential sources of infection.
- If the disease was diagnosed by agglutination titers, it is notable that *B. abortus*, *B. suis*, and *B. melitensis* cross react. *B. canis* is normally only associated with dogs and requires special diagnostic testing. Brucellosis is rarely contracted through milk in the United States, but the case or their household contacts should be questioned about consumption of raw milk, particularly in rural areas. Imported cheeses may be a potential source for Hispanic immigrants if they obtain soft or unpasteurized cheeses from Mexico [6].
- *B. melitensis* has become the major cause of human brucellosis in Latin America and, although it is normally associated with goats and their dairy products, it can infect cattle and sheep as well. Other unusual sources of *B. melitensis* include bison, elk, caribou, deer, and swine.
- If possible, obtain copies of the laboratory reports.
- Additional information may need to be collected if the disease appears to be locally acquired (job duties, food histories, and unusual risk factors).
- Identify symptomatic household members, associates, or co-workers and strongly urge them to contact their physician for a medical evaluation. Infections caused by *B. melitensis* may produce endocarditis if left untreated. Potential for untreated infections to produce spontaneous abortions, sexual transmission in humans, and transmission to infants through breastfeeding has not been confirmed. [5]
- Diagnostic testing is available through private laboratories.

Control Measures

See the Control of Communicable Diseases Manual, Brucellosis, "Methods of Control."

See the Red Book, Brucellosis, "Control Measures."

Tourists seeking information for vaccination or travel recommendations should be advised there is a high prevalence of this disease in underdeveloped countries. They should avoid any dairy product unless they can be absolutely certain it has been pasteurized. Foreign travel recommendations may be found via the Internet using www.cdc.gov/travel (2 May 2003) or www.tripprep.com (2 May 2003).

The incidence of human cases has been very low in the United States and most control measures have been designed to prevent the disease according to historic patterns of transmission. However, new strategies may be necessary in the event of large outbreaks involving unusual modes of transmission or bioterrorism events.

Laboratory Procedures

Specimens:

Specimens best suited for culturing include: blood (multiple), infected tissues and abscess material; bone marrow and tissue from spleen or liver can also be cultured, but may be available only at autopsy. *Brucella* has also been isolated from CSF, pleural fluid, peritoneal fluid and even urine. Specimens should be kept cold and transported to the Missouri State Public Health Laboratory (SPHL) as quickly as possible.

The SPHL can provide presumptive test results in about four hours using the real-time PCR test. The organism can be cultured by the SPHL as a confirmatory test. Because *Brucella* can be slow-growing, turn-around time on culturing the specimens is 24-72 hours minimum for a "presumptive;" complete identification and positive confirmation depends on how quickly organisms grow and other variables.

Additional information on laboratory procedures can be obtained from the Regional Communicable Disease Coordinator or from the SPHL web site at: http://www.dhss.state.mo.us/Lab/index.htm. (2 May 2003)

Reporting Requirements

Brucellosis is a Category I(B) disease and shall be reported to the local health authority or to the Missouri Department of Health and Senior Services (DHSS) within 24 hours of first knowledge or suspicion by telephone, facsimile or other rapid communication.

1. For confirmed and probable cases, complete a "Disease Case Report" (CD-1) and send the completed form to the DHSS Regional Health Office.

2. Entry of the completed CD-1 into the MOHSIS database negates the need for the paper CD-1 to be forwarded to the Regional Health Office.
3. For confirmed and probable cases complete a "Brucellosis Case Surveillance Report" (CDC 4.153) and send the completed form(s) to the Regional Health Office.
4. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax or e-mail) to the Regional Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Surveillance Report (CD-51).
5. Within 90 days of the conclusion of an outbreak, submit the final outbreak report to the Regional Communicable Disease Coordinator.

References

1. Chin, James ed. "Brucellosis (Undulant fever, Malta fever, Mediterranean fever)." Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000: 75-78.
2. American Academy of Pediatrics. "Brucellosis." In: Pickering, L. 2000 Red Book: Report of the Committee on Infectious Diseases. 25th Ed. Elk Grove Village, IL. 2000: 192-193.
3. Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR 1997; 46 (No. RR-10). "Brucellosis," 1997, http://www.cdc.gov/epo/dphsi/casedef/brucellosis_current.htm (2 May 2003)
4. Centers for Disease Control and Prevention. Human Exposure to Brucella abortus Strain RB51 -- Kansas, 1997. MMWR 1998:47 (09): 172-175. http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00051495.htm (2 May 2003)
5. Young, Edward J., and Hall, Wendall H. "Brucellosis." Bacterial Infections of Humans Epidemiology and Control. 3rd ed. Eds. Alfred S. Evans and Philip S. Brachman. New York: Plenum, 1998: 155-167.
6. Centers for Disease Control and Prevention. Epidemiological Notes and Reports Brucellosis – Texas. MMWR 1983:32 (No. RR-42): 548-553. http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00000163.htm (2 May 2003)
7. U.S. Army Medical Research Institute of Infectious Diseases. Medical Management of Biologic Causalities Handbook. 3rd Ed. July 1998.

Other Sources of Information

1. Young, Edward J. "Brucella species." Principles and Practice of Infectious Diseases. 5th Ed. Eds. Gerald L. Mandell, John E. Bennett, and Raphael Dolin. New York: Churchill Livingstone, 2000: 2386-2391.

2. The Merck Veterinary Manual. 8th Ed. Ed. Susan E. Aiello. Whitehouse Station, NJ: Merck & Co., Inc., 1998: 998-1002, 1043. http://www.merckvetmanual.com/mvm/index.jsp (search "brucellosis"). (2 May 2003)

3. Emerging Infectious Diseases: Michael J. Corbel: EID V3 N2: Brucellosis: An Overview http://www.cdc.gov/ncidod/eid/vol3no2/corbel.htm (2 May 2003)

4. Gerald E Maloney, Jr., DO, Brucellosis, eMedicine Journal, October 15 2001, V 2, N 10 http://www.emedicine.com/emerg/topic883.htm (2 May 2003)

5. Virginia Department of Health, Brucellosis Fact Sheet (Spanish) http://www.vdh.state.va.us/spanish/brucellf.htm (2 May 2003)

Brucellosis
FACT SHEET

What is brucellosis?

Brucellosis is a bacterial disease that is also referred to in humans as undulant fever. The disease is transferred from animals to man. The bacteria multiply in the reproductive organs and mammary glands of infected animals. Infected animals are most contagious when they deliver or abort. The disease is uncommon in the United States with an annual incidence of approximately 100 human cases. The disease is very common in underdeveloped countries. There are several different *Brucella* species.

Who gets brucellosis?

Anyone can get brucellosis if they are exposed. Occupations at highest risk in the United States are veterinarians, cattle ranchers, and slaughterhouse employees. Persons who consume unpasteurized milk and cheeses made with raw milk are also at risk. Brucellosis may be accidentally transmitted to humans by accidental exposure to live brucella vaccine for cattle.

How do humans get brucellosis?

Brucellosis is spread to humans through contact with blood, body tissues, or body fluids of infected animals. The most common method is consumption of unpasteurized milk and dairy products. Human infections may occur through breaks in the skin when handling infected animal tissues. In rare instances air-borne transmission of the disease may occur in laboratory settings or abattoirs.

What animals may carry the disease?

There are several species of *Brucella*. Domestic animals that may be infected include cattle, sheep, goats, dogs, and swine. Bison, elk, caribou, coyotes, and some species of deer may become infected. *Brucella canis,* the species that infects dogs and coyotes, is rarely diagnosed in humans.

How would I know if an animal had brucellosis?

The most obvious sign in animals may be spontaneous abortion. If you believe your livestock or pets may be infected, you should contact your veterinarian. They can arrange for the appropriate laboratory testing. If you have inquires about brucellosis in livestock you may wish to call the Missouri Department of Agriculture at 573-751-3377.

What are the symptoms of brucellosis?

In humans the disease is characterized by fever, night sweats, extreme fatigue, loss of appetite, weight loss, headache, and joint pain. The onset may be acute or insidious and the fever may be continuous, intermittent, or irregular. The disease may last for several days, months, or occasionally up to a year or more if not adequately treated.

How long is the incubation period for brucellosis?

The incubation period is highly variable and difficult to ascertain; usually 5 to 60 days; 1 to 2 months is commonplace; occasionally several months.

How is brucellosis diagnosed?

Since the disease is uncommon in the United States, diagnosing the disease requires laboratory tests. Several different methods are available from commercial labs to aid the clinician in diagnosis of the disease. Culture of the infectious agent is the most specific diagnostic method. Exposure history is very important in the diagnosis of suspected cases.

What is the treatment for brucellosis?

Treatment usually requires long-term antibiotic therapy. Some regimens may include two different antibiotics for six weeks or more. Relapses can occur due to sequestration of the organism.

Can human to human transmission of brucellosis occur?

It appears to be unlikely. You should consult with your physician if you have concerns in this area.

What possible complications may arise out of an untreated infection?

Brucellosis may produce a mild disease in humans or cause severe temporary or permanent damage if left untreated. Complications include damage to bones and joints, the genitourinary tract, meningitis, and endocarditis. Untreated *Brucella melitensis* infections associated with unpasteurized goat's milk and cheese will produce a 2% case fatality rate due to endocarditis (an infection of the heart valves).

How can brucellosis be prevented?

The most important measures to control the disease are already in place in the United States. Brucellosis causes fetal death and impairs the reproductive ability of livestock. Due to the economic loss, there is a national brucellosis eradication program for cattle. The federal and state agriculture departments working with farmers and ranchers have been highly successful in brucellosis eradication efforts in the United States.

While brucellosis is rare in the United States, it is up to the consumer to demand safe pasteurized dairy products. Do not buy dairy products from unlicensed retailers, street vendors, or other questionable sources. Food-borne transmission has become the most common means of exposure. Many of these cases are a result of consumption of cheese originating outside the United States. Persons traveling to Latin America, Eastern Europe, Central Asia, Africa, India, and the Mediterranean are at increased risk of exposure. Dairy products should be avoided unless you can be absolutely certain they were made from pasteurized milk.

Missouri Department of Health and Senior Services
Section for Communicable Disease Prevention
Phone: (866) 628-9891 or (573) 751-6113

BRUCELLOSIS CASE SURVEILLANCE REPORT

PERSONAL DATA

State		Reported to State Health Dept.		
Case No.		Month	Day	Year

FIRST FOUR LETTERS OF PATIENT'S NAME | **AGE** | **SEX**

☐☐☐☐

ADDRESS (County/State)

Date of Current Onset:	This Onset was:	Duration of Current Illness:	Date of Original Onset If Recurrence:	This Onset was:
	1 ☐ Acute			1 ☐ Acute
	2 ☐ Insidious			2 ☐ Insidious
	9 ☐ Not Stated	_____ Weeks		9 ☐ Not Stated

CLINICAL ILLNESS AND THERAPY

SYMPTOMS	DURATION OR SEVERITY
☐ Fever, Intermittent	
☐ Fever, Constant	
☐ Chills	
☐ Weight Loss	
☐ Sweating	
☐ Body Ache	
☐ Weakness	
☐ Headache	
☐ Malaise	
☐ Anorexia	
☐ Abscess (Bone, Joint, Muscle)	
☐ Other (specify)	

REMARKS:

THERAPY
Type, Duration and Route of Administration of:

☐ Tetracycline
☐ Streptomycin
☐ Sulfonamides
☐ Other (specify)
☐ Bed Rest (Duration)

REMARKS:

DIAGNOSTIC TESTS

Culture

Blood	Other Specimens (specify)	Date Collected	Date Examined	Isolation Results Pos.	Neg.	Unset.	Species Isolated	Culture Media	Laboratory
1)									
2)									
3)									
4)									

Serology

Std. Tube Tube Aggl.	Other Tests (specify)	Date Collected	Date Examined	Results (Titer, etc.)	Producer of Test Antigen	Laboratory
1)						
2)						
3)						
4)						
CDC – 7 S*						

Date Performed	Results Pos.	Neg.	Degree of Reaction	Producer of Test Antigen	Laboratory

*Sera positive by tube agglutination may be sent to the CDC for mercaptoethanol-resistant agglutinins test.

Type of Work or Activity at Onset:

Animal Contact within 6 Months Prior to Onset: 1☐ Yes   2☐ No   9☐ Unknown

If Yes, Place: Dates, From: _____ To: _____

PROBABLE SOURCE OF INFECTION

Brucellosis Status in Animal Contacts	Commercial Establishments*				Family Owned Animals			
	Cattle		Swine	Other (specify)	Cattle		Swine	Other (Specify)
	Beef	Dairy			Beef	Dairy		
Brucellosis: Present								
Not Present								
Status Unknown								
Under Investigation								
Abortions Noted								

*Includes stockyards, slaughterhouses, packinghouses, dairies, meathandlers, etc.

USE OF MILK OR MILK PRODUCTS

Type Of Product	Pasteurized			Date of Last Consumption Prior to Onset	Source of Milk
	Yes	No	Unk.		

Exposure to Brucella Vaccine: 1☐ Yes   2☐ No   If Yes, Date and Type of Exposure: _____

County Under Control Program: 1☐ Yes   2☐ No   If Yes, check   ☐ Modified Certified (Bovine)
                                                                    ☐ Certified Free (Bovine)
                                                                    ☐ Validated (Swine)

Additional information about recrudescent cases or those with insidious onset - type of work or activity, contact with animals, species and frequency, place of contact, dates:

_____ Signature

_____ Title